CLAIMS

What is claimed is:

1. A ceramic matrix composite turbine engine component comprising:

   a core insert section comprising a material selected from the group consisting of a silicon-silicon carbide composite and a monolithic ceramic; and

   an outer shell section comprising a silicon carbide-silicon carbide composite material, wherein the at least one outer shell section and the at least one core insert section are bonded together using a silicon melt infiltration process.

2. The turbine engine component of claim 1, wherein the component comprises a plurality of outer shell sections.

3. The turbine engine component of claim 1, wherein the component comprises a plurality of core insert sections and a plurality of outer shell sections.

4. The turbine engine component of claim 1, wherein the core insert section is a silicon-silicon carbide composite.

5. The turbine engine component of claim 4, wherein the core insert section is manufactured using a Silcomp process.

6. The turbine engine component of claim 1, wherein the core insert section is a monolithic ceramic material.

7. The turbine engine component of 2, wherein the outer shell section is silicon carbide-silicon carbide composite material.

8. The turbine engine component of claim 7, wherein the outer shell section is manufactured using a slurry cast melt infiltration process.

9. The turbine engine component of claim 7, wherein the outer shell section is manufactured using a prepreg melt infiltration process.

10. The turbine engine component of claim 1, wherein the component is a turbine vane.

11. The turbine engine component of claim 1, wherein the component is a turbine nozzle.

12. A method of manufacturing a ceramic matrix composite turbine blade comprising the steps of:

providing a core insert section having a preselected geometry, the core insert section comprising a material selected from the group consisting of silicon carbide-silicon carbide composite preform having at least some porosity, silicon-silicon carbide composite, silicon-silicon carbide composite preform having at least some porosity, silicon-silicon carbide composite, and a monolithic ceramic;

providing a plurality of plies of silicon carbide prepreg cloth;

laying up a preselected number of silicon carbide prepreg plies to form an outer shell section;

assembling the core insert section and the outer shell section into a turbine blade form, the turbine blade form comprising a dovetail section and an airfoil section, wherein the core insert section is positioned in the dovetail section of the turbine blade form;

autoclaving the turbine blade form;

filling remaining porosity in the turbine blade form with at least silicon using a silicon melt infiltration process, the filling also forming a bond between the core insert section and the outer shell preform.

13. The method of claim 12, wherein the core insert section is a silicon-silicon carbide preform.

14. The method of claim 13, wherein the silicon-silicon carbide preform includes carbon microspheres.

15. The method of claim 12, wherein the core insert section is a silicon carbide-silicon carbide preform manufactured using a slurry cast process.

16. The method of claim 12, wherein the core insert section is a silicon carbide-silicon carbide preform manufactured using a prepreg process.

17. A method of manufacturing a ceramic matrix composite turbine blade comprising the steps of:

providing a core insert section having a preselected geometry, the core insert section comprising a material selected from the group consisting of a silicon carbide-silicon carbide composite preform having at least some porosity, a silicon-silicon carbide composite, the silicon-silicon carbide composite preform having at least some porosity, a silicon-silicon carbide composite, and a monolithic ceramic;

providing an outer shell section preform, the outer shell preform having at least some porosity;

assembling the core insert section and the outer shell preform into a turbine blade form, the turbine blade form comprising a dovetail section and an airfoil section, wherein the core insert section is positioned in the dovetail section of the turbine blade form; and

filling remaining porosity in the turbine blade forms with at least silicon using the silicon melt infiltration process, the filling also forming a bond between the at least one core insert section and the at least one outer shell preform.

18. The method of claim 17, wherein the core insert section is a silicon-silicon carbide preform.

19. The method of claim 18, wherein the silicon-silicon carbide preform includes carbon microspheres.

20. The method of claim 19, wherein the core insert section is a silicon carbide-silicon carbide preform manufactured using a slurry cast process.